

What is claimed is:

1. Apparatus for filling at least one cartridge with a fluid, the cartridges having a container with a wall and an entrance orifice, said apparatus comprising:
  - a housing for receiving a container holding the fluid, the container having a fluid discharge orifice covered by a septum; and
  - a septum opening device affixed to said housing for severing the septum in response to the relative movement of the container with respect to said septum opening device.
2. Apparatus according to claim 1 and further comprising:
  - an optional metering station for receiving an amount of fluid from the container for transfer to a cartridge.
3. Apparatus according to claim 2 and further comprising:
  - a valve for transmitting a predetermined amount of fluid to a cartridge.
4. Apparatus according to claim 2 and further comprising a conduit for defining a path for fluid from the container to said metering station, and a conduit defining a path for atmospheric air to the container, said conduits defining the respective paths in response to the severing of the septum on the container.
5. Apparatus according to claim 2 wherein said metering station is compressible for discharging the fluid received from the container for transfer to a cartridge.
6. Apparatus according to claim 1 wherein said housing further comprises a container support for supporting a container in an inverted position with the septum-covered discharge orifice facing downward, and wherein said septum opening device comprises a piercing member for piercing the septum in response to placing a container on said container support.

7. Apparatus according to claim 4 and further including a fluid conduit for entering a container supported in said housing, said fluid conduit including a one-way valve for releasing fluid from the container to said metering station.

8. Apparatus according to claim 4 and further including an air conduit for transferring air to the container, and a one-way valve for admitting air to the container.

9. Apparatus according to claim 2 wherein said housing comprises a container support for supporting a container in an inverted position with the septum covered discharge orifice facing downward, and wherein said metering station comprises:

a chamber defined by first walls fixed with respect to said housing, and second walls, said first and second walls being movable with respect to each other to compress said chamber and force fluid from said chamber into a cartridge.

10. Apparatus according to claim 9 wherein the cartridge is covered with an openable cover, and wherein said second walls include a cover opening portion for opening the openable cover over the orifice of a cartridge for defining a sterile procedure for fluid access to the cartridge before, during and after filling.

11. Apparatus according to claim 9 wherein said first and second walls have an open position for defining said chamber to form a relatively large cavity and a closed position for defining said chamber to form a relatively small cavity, and wherein said apparatus further includes a spring structure for biasing said first and second walls to the open position.

12. Apparatus according to claim 11 wherein said apparatus includes a cartridge receiver, said cartridge receiver comprising:

said second walls for cooperating with said first walls to define said chamber; and

channel walls defining a channel for providing a fluid path delivering fluid from said metering station to a cartridge.

13. Apparatus according to claim 12 wherein said cartridge receiver further includes a one-way valve in said channel for preventing the flow of fluid from said metering station where there is no cartridge to receive the fluid.

14. Apparatus according to claim 1, wherein each cartridge includes a piston inside the cartridge for defining a fluid container between the piston and the cartridge orifice, the piston moving away from the orifice as fluid enters the container, said apparatus further including:

a protrusion for receiving the outer surface of the cartridge piston for determining the maximum amount of fluid for reception by the cartridge.

15. Apparatus for filling at least one cartridge with fluid, the cartridge having an orifice at one end, said apparatus comprising:

a housing for receiving a container holding the fluid, the container having a rim defining a discharge orifice and a septum over the orifice, said housing comprising:

a container holding portion for holding a container in an inverted position with the septum covered orifice facing downwardly;

a container support for supporting the container rim and the container, said container support having a bored spike for piercing the septum, said bored spike having both a fluid conduit for discharging fluid from the container with a one-way valve for preventing leakage through the fluid conduit, and an air conduit for the flow of atmospheric air into the container with a one-way valve for preventing other flow through said air conduit; and

a neck portion forming part of a collapsible chamber of a metering station.

16. Apparatus according to claim 15 and further comprising:  
a cartridge receiver fixed relative to said housing, said cartridge receiver comprising:

metering structure for cooperating with said neck portion of said housing to form the collapsible chamber of said metering station;

a tubular member extending from said metering station for defining a fluid flow path from said metering station to a cartridge, with a one-way valve in said tubular member to prevent leakage of fluid from said tubular member.

17. Apparatus according to claim 16 and further comprising:  
a biasing device for biasing said housing away from a cartridge to enlarge the size of the chamber of said metering station.

18. Apparatus according to claim 17 and further comprising:  
a platform for supporting at least one cartridge to be filled, said platform having at least one protrusion for extending into the end of a cartridge opposite the orifice end of the cartridge for establishing the maximum content of the cartridge.

19. Apparatus according to claim 18 and further comprising:  
an interface device for interfacing a cartridge with said apparatus, wherein said tubular member extends between said metering station and said interface device for defining the fluid flow path from said metering station to the cartridge.

20. Apparatus according to claim 19 wherein the orifice of the at least one cartridge is covered with an openable flexible sheet, said apparatus further comprising:  
an orifice sheet opener for opening the sheet covering the orifice of the cartridge to provide access to the orifice of the cartridge;

wherein when a cartridge is disposed in said interface device and force is applied to said housing to cause the orifice sheet opener to open the sheet covering the orifice of the cartridge and to decrease the size of said metering station, to force fluid from said metering station, through said tubular member, through the opened sheet cover of the cartridge and into the cartridge, fluid being discharged from the container through said container conduit and air being admitted to the container through said air conduit, said housing being thereafter moved to enlarge the size of the chamber of said metering station upon the filling of the cartridge with the fluid.

21. Apparatus for directing fluid discharged from a container and for holding a cartridge to receive the discharged fluid, said apparatus cooperating with structures forming one portion of a metering station having a variable size chamber for holding fluid from the container prior to the transfer of the fluid to the cartridge, said apparatus comprising:

an interface device comprising:

a second portion of the station for cooperating with the one portion of the metering station;

a receiver end for receiving a cartridge to be filled with fluid;

a tubular member extending between the metering station and said receiver end for defining a fluid flow path from the metering station to a received cartridge, with a one-way valve in said tubular member to prevent leakage of fluid from said tubular member; and

a biasing device interconnecting said interface device and the one portion for biasing the one portion away from said interface device to enlarge the size of the chamber of the metering station.

22. Apparatus according to claim 21 wherein the cartridge orifice is covered with an openable flexible sheet, and has a wall defining an interior of the cartridge, an opening at the end opposite the orifice and a movable piston disposed in the interior of the cartridge and being movable away from the cartridge orifice as the cartridge is being filled, the final amount the piston can be moved away from the orifice determining the total amount of fluid admissible into the cartridge, said apparatus further comprising:

a platform for supporting the cartridge to be filled, said platform having a protrusion for extending into the end of a cartridge opposite the orifice end of the cartridge for establishing the maximum content of the cartridge.